

**What Is Claimed Is:**

1. A detecting element of a MILES for determining a hit by detecting a light shot from a light transmitter, the element comprising:

an optical detector cell of a planar shape for generating an electric  
5 signal when detecting a light;

a protection case of a cylindrical shape for supporting the optical detector cell housed inside thereof;

a set of lead wires, each of which being electrically connected to an anode electrode and a cathode electrode of the optical detector cell for  
10 transmitting the electric signal generated from the optical detector cell to hit determination means; and

a protection shield located on a front light detecting surface of the optical detector cell for protection of the same from external environment and shielding noise light , wherein

15 the protection case of a cylindrical shape has an open front surface,  
the optical detector cell of a planar shape is located to be adjacent to the open front surface of the protection case, and the rear surface of which is supported by a packing material packed inside of the protection case, and

20 the set of lead wires is elongated from the rear surface of the optical detector cell and protected by the packing material.

2. The detecting element of claim 1, further comprising conductive mesh located on a front light detecting surface of the optical detector cell for passing the light and filtering an electronic wave.

25 3. The detecting element of claim 1, wherein the protection case

is attachable and detachable.

4. The detecting element of claim 1, wherein the protection shield and the packing material are chemically combined into a single unit for surrounding and supporting the optical detector cell.

5 5. The detecting element of claim 1, wherein the set of lead wires are drawn outside of the protection case by being connected to two anode contact points and two cathode contact points, respectively,

the lead wires connected to a first anode electrode contact point of the two anode electrode contact points are connected to an anode electrode  
10 contact point of the first detecting element of the two detecting elements, which are adjacent to both sides of the detecting element, and the lead wires connected to a second anode electrode contact point is connected to an anode electrode contact point of the second detecting element of the two adjacent detecting elements, and

15 the lead wires connected to a second cathode electrode contact point of the two cathode electrode contact points are connected to a cathode electrode contact point of the first detecting element, and the lead wires connected to a second electrode contact point are connected to a cathode electrode contact point of the second detecting element.

20 6. The detecting element of claim 5, wherein the set of lead wires further comprises ground wires connected to two spaced GNDs of the optical detector cell, one of which is connected to a ground wire of the first detecting element, and the other of which is connected to a ground wire of the second detecting element.

25 7. The detecting element of claim 1, further comprising lead

wire holes of a tunnel shape penetrating side surfaces of the protection case in horizontal direction so as to draw the set of lead wires outward.

8. The detecting element of claim 1, further comprising a protrusion protection section having a front surface further protruded forward of a front surface of the protection case than the protection shield while surrounding a periphery thereof.

9. The detecting element of claim 8, further comprising lead wire holes of a tunnel shape penetrating all the side surfaces of the protection case and the adjacent protrusion protection section in horizontal direction so as to draw the set of lead wires outward.

10. The detecting element of claim 1, further comprising:

a protrusion protection section formed to have a front surface further protruded than the protection shield toward the direction of a front surface of the protection case while surrounding a periphery of the protection case, and a rear surface further protruded than the protection case toward the direction of a rear surface of the protection case, and lead wire holes of a tunnel shape penetrating side surfaces thereof in horizontal direction; and

a lower cover section of a planar shape, a periphery of which is engaged with the rear surface of the protrusion protection section for sealing of the rear surface of the protection case, wherein

the set of lead wires is drawn outward from the rear surface of the protection case through the lead wire holes, and

a second packing material is packed between the rear surface of the protection case and the lower cover section to seal and protect the set of lead wires.

11. The detecting element of claim 1, further comprising:

a protrusion protection section formed to have a front surface further protruded than the protection shield toward the direction of a front surface of the protection case while surrounding a periphery of the protection case;

5 and

a lower cover section of a planar shape, a periphery of which is engaged with the rear surface of the protrusion protection section for sealing of the rear surface of the protection case, wherein

the side surfaces of the protruded periphery of the lower cover  
10 section include lead wire holes of a tunnel shape penetrated in horizontal direction,

the set of lead wires are drawn outward from the rear surface of the protection case through the lead wire holes, and

a second packing material is packed between the rear surface of the  
15 protection case and the lower cover section to seal and protect the set of lead wires.

12. The detecting element of claim 1, further comprising detecting element ID generation means for generating an electric signal to represent an original ID of the detecting element.

20 13. The detecting element of claim 1, further comprising signal amplifying means for amplifying the electric signal generated from the optical detector cell.

14. The detecting element of claim 1, wherein the hit determination means is at least more than one of the microprocessor  
25 connected to the detecting element by means of wire communication or the

central control system connected to the detecting element by means of wireless communication.

15. A detecting device of a MILES for determining a hit by detecting a light shot from a light transmitter, the device including a plurality of detecting elements electrically connected to one another, each  
5 of which comprising:

an optical detector cell of a planar shape for generating an electric signal when detecting a light; a protection case of a cylindrical shape for supporting the optical detector cell housed inside thereof; a set of lead  
10 wires connected to an anode electrode and a cathode electrode of the optical detector cell, respectively, for transmitting the electric signal generated from the optical detector cell; and a protection shield located on a front light detecting surface of the optical detector cell for protecting the same and shielding noise light ,

15 the protection case of the cylindrical shape having an open front surface, the optical detector cell of a planar shape being located to be adjacent to the open front surface of the protection case and the rear surface of which being supported by a packing material packed inside of the protection case, and the set of lead wires being drawn outward through  
20 lead wire holes formed to penetrate the protection case,

the plurality of detecting elements being connected to one another in parallel by the set of lead wires, the tips of which including a microprocessor (MPU) for determining a hit after receiving the electric signal generated from the optical detector cell from the set of lead wires.

25 16. The detecting device of claim 15, wherein one of the

detecting elements further comprises a protrusion protection section further protruded forward of a front surface of the protection case than the protection shield while surrounding a periphery thereof.

17. The detecting device of claim 15, further comprising a lower  
5 cover section of a planar shape, a periphery of which being engaged with a rear surface of the protrusion protection section for sealing a rear surface of the protection case.

18. The detecting device of claim 17, wherein the side surfaces of the protruded periphery of the lower cover section include a second lead  
10 wire hole of a tunnel shape penetrated in horizontal direction, and the set of lead wires are drawn outward from the protection case through the second lead wire hole, and

a second packing material is packed between the rear surface of the protection case and the lower cover section to seal and protect the set of  
15 lead wires.

19. The detecting device of claim 15, wherein the set of lead wires are drawn to the rear surface of the protection case by being respectively connected to two anode electrode contact points and two cathode electrode contact points that are spaciouly mounted on the optical  
20 detector cell of the detecting device so as to connect the plurality of detecting elements in parallel, wherein

the lead wire connected to the first anode electrode contact point of the two anode electrode contact points is connected to the anode electrode contact point of the first detecting element between the two detecting  
25 elements adjacent to both sides of the detecting element, and the lead wire

connected to the second anode electrode contact point is connected to the anode electrode contact point of the second detecting element adjacent to the opposite side,

the lead wire connected to the first cathode electrode contact point  
5 of the two cathode electrode contact points is connected to the cathode electrode contact point of the first detecting element between the two detecting elements adjacent to both sides of the detecting element, and the lead wire connected to the second cathode electrode contact point is connected to the cathode electrode contact point of the second detecting  
10 element adjacent to the opposite side.

20. The detecting device of claim 19, wherein the set of lead wires further comprises a ground connected to two spaced GNDs of the optical detector cell, wherein the first ground is connected to the ground of the first detecting element, and the second ground is connected to the  
15 ground of the second detecting element.

21. The detecting device of claim 15, further comprising a communication module for supplying a signal generated from the microprocessor to the transmitter.

22. The detecting device of claim 21, wherein the signal  
20 generated from the microprocessor is at least more than one of the ID signal representing an ID of the detecting device or a transmitter control signal for interrupting operation of the transmitter upon determination of a hit of the detecting device.

23. The detecting device of claim 15, further comprising a  
25 communication module for supplying the signal generated from the

microprocessor to a remotely located central control system.

24. The detecting device of claim 23, wherein each detecting element further comprises detecting element ID generation means for generating an original ID signal and supplying the same to the microprocessor when generating the electric signal, and the microprocessor supplies the information as to which detecting element has been hit to the central control system based on the received original ID signal.

25. The detecting device of claim 23, wherein each detecting element further comprises signal amplifying means for amplifying the electric signal generated from the optical detector cell, and the microprocessor supplies the information as to how many detecting elements have been hit to the central control system by measuring the amplified electric signal values.

26. The detecting device of claim 23, further comprising a GPS module for indicating location of the detecting device.

27. The detecting device of any one of claims 15 to 26, wherein the plurality of detecting elements may be spaciouly mounted on chest, belly, back or head portions of a soldier.

28. The detecting device of any one of claims 15 to 26, wherein the plurality of detecting elements may be spaciouly mounted on a surface of a weapon used in at least one of the land, sea or air.

29. A gun simulation system comprising:

percussion signal generation means for generating a percussion signal when a trigger of a gun is pulled;

percussion signal output means for outputting the generated



percussion signal;

a housing of a magazine, an upper tip of which is inserted and fixed into a magazine insertion section of the gun; and

a laser light transmitter attached to the gun for shooting a laser light  
5 toward a target, wherein the housing includes

percussion signal input means for receiving the percussion signal outputted from the percussion signal output means,

shooting mode designation means for designating a shooting mode of the laser light transmitter,

10 a microcomputer for generating a responsive shooting signal upon recognition of a shooting mode designated by the shooting mode designation means after receiving the percussion signal from the percussion signal input means, and

shooting signal output means for supplying the shooting signal  
15 generated from the microcomputer to the laser light transmitter,

the laser light transmitter having shooting signal input means for receiving the shooting signal outputted from the shooting signal output means and shooting a laser light based on the inputted shooting signal, whereby a simulation is performed as if the target has been hit when the  
20 shot laser light is incident to the detecting element mounted on the target.

30. The gun simulation system of claim 29, wherein the percussion signal generation means includes a piezoelectric element attached to a front surface of the trigger for generating a percussion signal by changing the shape thereof due to a force of pulling the trigger.

25 31. The gun simulation system of claim 29, wherein the

percussion signal generation means includes a switching element attached to a rear surface of the trigger for generating a percussion signal by being pushed due to a force of pulling the trigger.

32. The gun simulation system of claim 29, wherein the  
5 percussion signal output means supplies the percussion signal to the percussion signal input means in either one of the wired or wireless manner.

33. The gun simulation system of claim 29, wherein the shooting  
mode controls the number of shooting of the laser light to correspond at  
least to any one of automatic, semi-automatic or locked mode of the gun  
10 with respect to a single percussion signal.

34. The gun simulation system of claim 29, wherein the shooting  
signal output means supplies the shooting signal to the shooting signal  
input means in either one of wired or wireless manner.

35. The gun simulation system of claim 29, wherein the laser  
15 light is a consecutive pulsar wave complying with the MILES code rules.

36. The gun simulation system of claim 30, wherein the  
percussion signal generation means further comprises supporting means of  
a band shape for supporting the piezoelectric element by surrounding a  
periphery of the trigger.

20 37. The gun simulation system of claim 36, wherein the  
percussion signal generation means further comprises skid-proof means  
located between the supporting means and a trigger protection frame for  
supporting the supporting means so as not to skid from the trigger.

38. The gun simulation system of claim 29, wherein the housing  
25 further comprises a speaker for generating a necessary sound through

control by the microcomputer.

39. The gun simulation system of claim 38, wherein the sound includes at least more than one of a simulated shooting sound of the gun, a control command, or a report notifying abnormal operation of the simulation system.

40. The gun simulation system of claim 29, wherein the housing further comprises a flash generator for simulating a shooting flash of the gun.

41. The gun simulation system of claim 40, wherein the flash generator includes a luminous element mounted on an external front surface of the housing.

42. The gun simulation system of claim of claim 29, wherein the housing further comprises an impact generator for simulating a shooting impact of the gun.

43. The gun simulation system of claim 42, wherein the impact generator is at least either one of a piezoelectric element or a compressed gas discharger that can be vibrated by the electric signal.

44. The gun simulation system of claim 29, wherein the housing further comprises a wireless communication module for performing wireless communication.

45. A simulated magazine of a magazine shape used in a gun simulation system, including an upper tip inserted and fixed into a magazine insertion section of a gun, for shooting a laser light from a laser light transmitter attached to a gun barrel by pulling a trigger of a gun and simulating a hit of a target bearing a detecting element, the simulated

magazine comprising:

percussion signal input means for receiving a percussion signal generated by pulling of a trigger of the gun;

shooting mode designation means for designating a shooting mode  
5 of the laser light transmitter;

a microcomputer for generating a responsive shooting signal upon recognition of a shooting mode designated by the shooting mode designation means after receiving the percussion signal from the percussion signal input means; and

10 shooting signal output means for supplying the shooting signal generated from the microcomputer to the laser light transmitter.

46. The simulated magazine of claim 45, further comprising a speaker for generating a necessary sound through control by the microcomputer.

15 47. The simulated magazine of claim 46, wherein the sound includes at least more than one of a simulated shooting sound of the gun, a control command, or a report notifying abnormal operation of the simulation system.

48. The simulated magazine of claim 45, further comprising a  
20 flash generator for simulating a shooting flash of the gun.

49. The simulated magazine of claim 48, wherein the flash generator includes a luminous element mounted on an external front surface of the housing.

50. The simulated magazine of claim 45, further comprising an  
25 impact generator for simulating a shooting impact of the gun.

51. The simulated magazine of claim 50, wherein the impact generator is at least one of a piezoelectric element or a compressed gas discharger that can be vibrated by an electric signal.

52. The simulated magazine of claim 45, further comprising a  
5 wireless communication module for performing wireless communication.

53. The simulated magazine of claim 46, further comprising circuit test means for checking abnormal operation of each means, and notifying abnormality by means of the speaker, if found.

54. A gun simulation system comprising:  
10 percussion signal generation means for generating a percussion signal when a trigger of a gun is pulled;

percussion signal output means for outputting the generated percussion signal;

a housing of a magazine inserted and fixed into a magazine insertion  
15 section of the gun to have any one shape of a magazine, a cartridge or a bomb shell; and

a laser light transmitter attached to the gun for shooting a laser light toward a target, the housing including

percussion signal input means for receiving the percussion signal  
20 outputted from the percussion signal output means,

shooting mode designation means for designating a shooting mode of the laser light transmitter,

a microcomputer for generating a responsive shooting signal upon recognition of a shooting mode designated by the shooting mode  
25 designation means after receiving the percussion signal from the

percussion signal input means, and

shooting signal output means for supplying the shooting signal generated from the microcomputer to the laser light transmitter,

the laser light transmitter having shooting signal input means for  
5 receiving the shooting signal outputted from the shooting signal output means and shooting a laser light based on the inputted shooting signal, whereby a simulation is performed as if the target has been hit when the shot laser light is incident to the detecting element mounted on the target.

55. A gun simulation system comprising:

10 percussion signal generation means for generating a percussion signal when a trigger of a gun is pulled;

percussion signal output means for outputting the generated percussion signal;

a housing of a magazine inserted and fixed into a magazine insertion  
15 section of the gun to have any one shape of a magazine, a cartridge or a bomb shell; and

a laser light transmitter attached to the gun for shooting a laser light toward a target,

the percussion signal output means being a cable lead wire  
20 electrically connected to the laser light transmitter for transmitting the percussion signal to the laser light transmitter, wherein

the laser light transmitter receives and converts the percussion signal to a digital signal so as to shoot a laser light based on the converted signal and simulate that a target has been hit if the shot laser light is  
25 incident to a detecting element mounted on the target.

56. A gun simulation system, comprising:

percussion signal generation means for generating a percussion signal when a trigger of a gun is pulled;

5 percussion signal output means for outputting the generated percussion signal;

a housing of a magazine inserted and fixed into a magazine insertion section of the gun to have any one shape of a magazine, a cartridge or a bomb shell; and

10 a laser light transmitter attached to the gun for shooting a laser light toward a target, wherein

the percussion signal output means generates a wireless percussion signal to be wirelessly transmitted to the laser light transmitter,

the laser light transmitter receives and converts the wireless percussion signal to a digital signal so as to shoot a laser light based on the  
15 converted signal and simulate that a target has been hit if the shot laser light is incident to a detecting element mounted on the target.